

TUGB Revolution

Concept for a revolutionary TUGB test line for tires

- Cycle time savings of 4 -> 8 seconds compared to a conventional TU machine
- fully automatic rim change integrated in full mixed operation
- fully automatic rim width adjustment without affecting throughput
- one-time filling of the tire for all measurements and markings
- No adjustment of the belt conveyor - width required, no stripper
- two or more spindles for uniformity / geometry / balancing / marking
- comparatively simple balancing concept without adjustment of the mouth width
- extremely large range of tire dimensions possible
- Marking on the inflated tire is possible
- Concept can also be extended to high-speed machines
- Use of robots is recommended

Hanover, March 2025, Siegmur Ahlvers

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Conventional UGB test line for tires



1. Bead lube station
2. Measuring station TU / (TG)
3. Rim change assistent 01
4. Marking station 01
5. Measuring station TB / (TG)
6. Rim change assistent 02
7. Marking station 02
8. Sorting lift



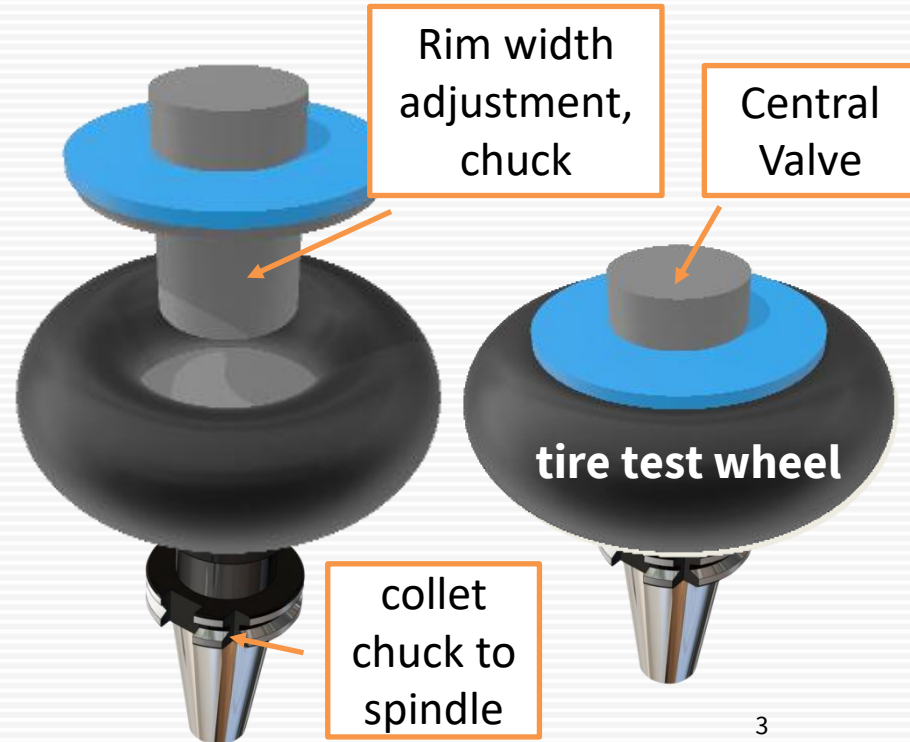
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Revolutionary UGB test : Test wheel instead of tire

Core component

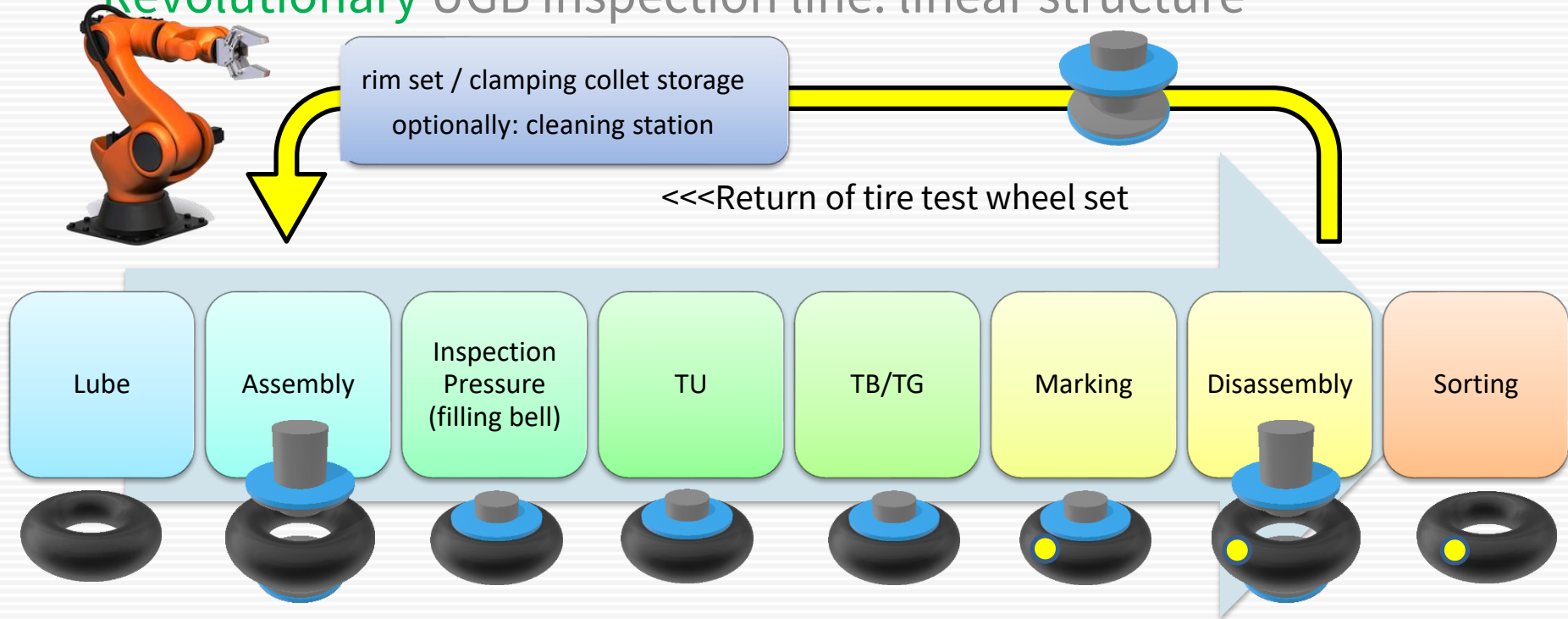
Tire Collet Chuck

- Upper single step rim (2 steps optionally), valve for inspection pressure
- jacket with rim interlock and rim width adjustment
- Lower single step rim, central hole for collet chuck
- **RFID chip** for tooling compensation
- together with the tire it forms **the tire test wheel** or measurement wheel



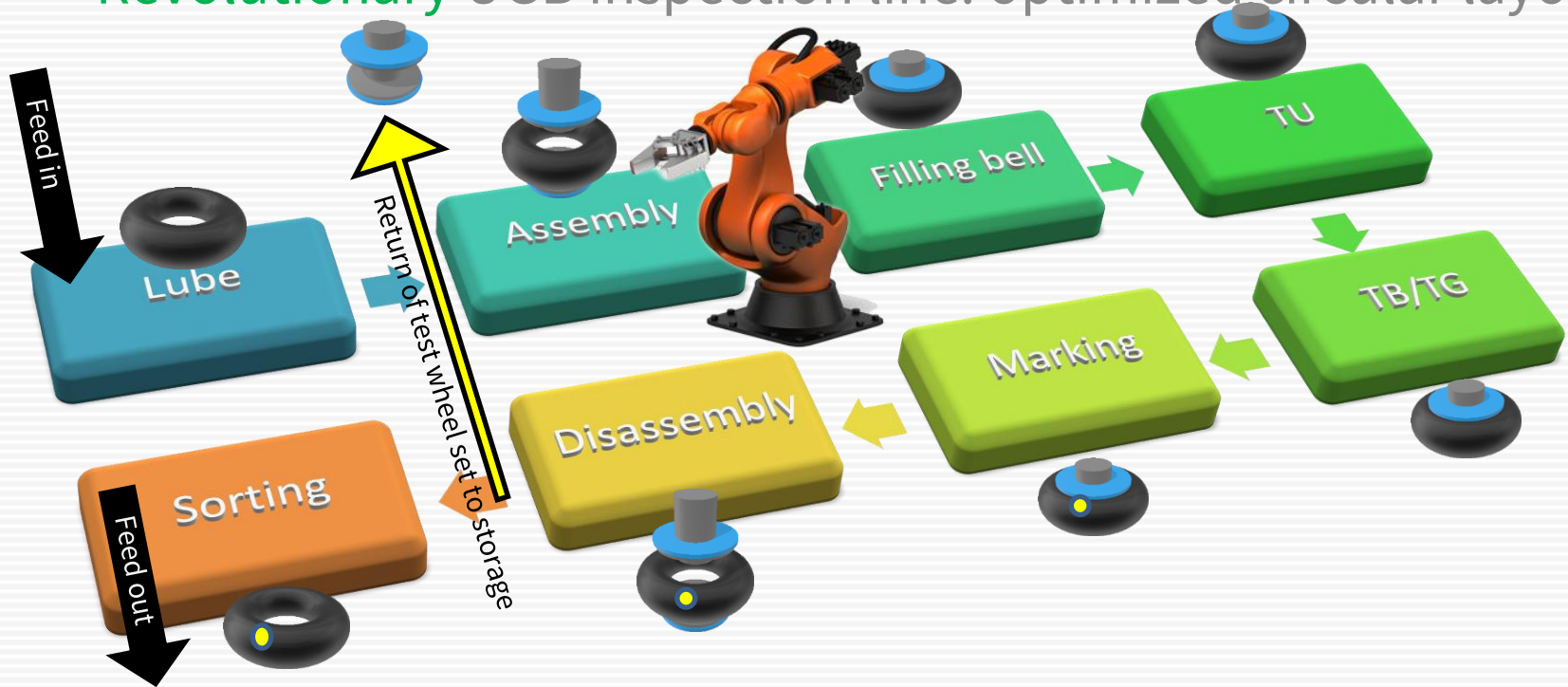
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Revolutionary UGB inspection line: linear structure



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Revolutionary UGB inspection line: optimized circular layout




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Typical market leader machine

Conventional UGB test line for tires: process steps measuring station

Measuring station TU / TG

TU@2Bar cw/ccw 18s +TG@4Bar 4s: 22s cycle time

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- (1) Set the rim width when changing the article
 - (2) Center the tires in the conveying direction
 - (3) Place the tire on the lower rim
 - (4) Feed in the upper rim
 - (5) Lock the rims
 - (6) Tighten tires with setting pressure
 - (7) If necessary, adjust the rim width for soft tires
 - (8) Apply test pressure TU
 - (9) Bring tires up to speed
 - (10) TU measurement including change of direction of rotation with 2 directions
 - (11) Test pressure TG
 - (12) TG measurement
 - (13) Optionally: rotate tire to marking angle
 - (14) Deflate tire
 - (15) Unlock the rims
 - (16) Strip off tire
 - (17) Move the lifting table to the transport level
 - (18) Feed out tire
 - (19) Optionally: TB measurement in the next station, repeat steps 1 to 7 etc.

← 14s expected!

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Revolutionary UGB test line for tires: process steps in 2 measuring stations



Measuring station (1) TU cycle time max 14s

- (1) Center the **tire test wheel** in the conveying direction
- (2) Clamp the tire test wheel on the TU spindle
- (3) Bring tire test wheel up to speed
- (4) TU measurement including change of direction of rotation (2 directions)
- (5) Release the **tire test wheel** and move it to the next measuring station (2)

TU@2Bar cw/ccw: 14s

TB @2Bar TG@4Bar: less 14s incl. marking

2 tires measured on 2 spindles simultaneously, therefore max .14s cycle time per tire

Measuring station (2) TB / TG cycle time less 14s

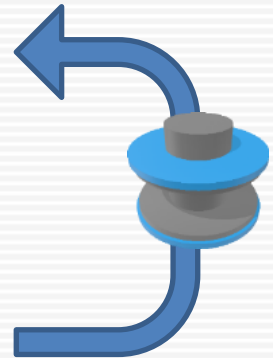
- (1) Clamp the **tire test wheel** on the TB spindle
- (2) Bring tire test wheel up to speed
- (6) TB measurement
- (7) Test pressure TG
- (8) TG measurement
- (9) rotate **tire test wheel** to marking angle and apply marks
- (10) alternatively mark tire in a separate marking station
- (11) Release **tire test wheel** to disassembling unit
- (12) Deflate **tire test wheel** and release the tire
- (13) Feed out empty **tire test wheel tools** back to tooling unit
- (14) Feed out tire to sorting station



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Revolutionary UGB inspection line: Part machines, structure

1. Lube station
2. Tire / test wheel assembly station, Inflation bell / Inspection pressure, Test wheel storage
3. Measurement station TU
4. Drop Conveyor optional for intermediate storage of tire test wheel
5. Measurement station TB / TG
6. Marking station
7. Tire / test wheel disassembly station / test wheel return station
8. Sorting lift / Robot



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Revolutionary UGB inspection line: Lube station functions

Lube station functions

- receive the tire
- center the tire
- lube the bead
- read barcode
- detect position of barcode
- turn tire with respect to the barcode to conveying direction
- conveying the tire to assembly station



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Revolutionary UGB inspection line: Assembly station functions

Assembly station functions

- conveying well centered lower part of test wheel from test wheel storage
- Receive tire and position it on the lower part of test wheel
- Adjust rim width to required bead width of the tire
- Assembly of upper part of the test wheel
- Feed complete assembly to inflation bell



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Revolutionary UGB inspection line: Inflation bell functions

Inflation bell functions

- Receive test wheel
- To lower the inflation bell and press to the tire sidewall
- Inflation to test pressure
- Release inflation bell
- Conveying the test wheel to the TU station



Alternative to the inflation bell method: inflation via valve, use of gravity for tires with soft sidewalls. The upper rim is guided "loosely" and rises when the test pressure is applied

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Revolutionary UGB inspection line: TU function

TU functions

- Receive test wheel with tire
- Clamp test wheel
- Execute TU measurement
- Conveying test wheel to TB / TG station



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Revolutionary UGB inspection line: TB/TG functions

TB/TG functions

- Receive measurement wheel with tire
- clamping of measurement wheel
- Execute TB measurement
- Tooling compensation via RFID chip
- Inflate to TG pressure 4 Bar
- Execute TG measurement
- Conveying test wheel to marking station



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Revolutionary UGB inspection line: Marking functions

Marking functions

- Receive test wheel with tire
- Clamping of test wheel
- Apply markings
- Conveying of test wheel to disassembly station



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Revolutionary UGB inspection line: Disassembly functions

Disassembly functions

- Receive test wheel with tire
- Disassembly of tire
- Return test wheel set back to storage
- Conveying tire to sorting lift



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Revolutionary UGB inspection line: Sorting lift functions

Sorting lift functions

- Receive tire
- Adjust lift to outfeed level
- Conveying of tire to conveying system



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Summary

This TUGB final finishing concept would be quite demanding to realize. The machinery itself could be more or less standard as it is used in the tire wheel assembly industry.

However the tooling would require a lot of precision, specially if you consider tire balancing measurement. The „artificial wheel“ has to consist of top and bottom rims, a valve and the possibility to adjust to different rim width. A precision collet would be required too. All parts need to be balanced extremely well and sustainable. Here I see the main bottleneck. However it would be interesting to know if any tire producer had tested such a concept.

In case of interest for discussion you may contact me preferably by email to siegmar@ahlvers.de.

Hanover, March 2025